Claims

1. A method of driving a liquid crystal display device in which two substrates having respective electrodes for driving liquid crystal on opposing surfaces are provided opposing each other with a liquid crystal layer therebetween and comprising a plurality of pixels, wherein

a liquid crystal drive voltage applied to the liquid crystal layer in each pixel is maintained at a same polarity with respect to a predetermined reference, for a period of two frame periods or longer.

2. A method of driving a liquid crystal display device according to Claim 1, wherein

the liquid crystal drive voltage is maintained at the same polarity for a period of 10 seconds or longer.

3. A method of driving a liquid crystal display device according to Claim 1 or 2, wherein

a polarity of the liquid crystal drive voltage is inverted with a minimum unit of a screen drive period which corresponds to a drive period of all pixels of the plurality of pixels.

4. A method of driving a liquid crystal display device according to any one of Claims 1 through 3, wherein

a period t over which the liquid crystal drive voltage is applied at a same polarity is set to a period which is shorter than or equal to a period in which a relationship between a maximum application voltage Vpmax which is applied to the liquid crystal layer and a residual direct current voltage Vdc generated in the

liquid crystal layer when the maximum application voltage Vpmax is applied to the liquid crystal layer at a same polarity for the period t satisfies the following equation (1):

$$Vdc \leq 0.1 * Vpmax \quad \ldots (1)$$

5. A method of driving a liquid crystal display device according to any one of Claims 1 through 4, wherein

application times of the liquid crystal drive voltage for a positive polarity which is applied to the liquid crystal layer and the liquid crystal drive voltage of a negative polarity which is applied to the liquid crystal layer are set equal to each other.

6. A method of driving a liquid crystal display device according to any one of Claims 1 through 5, wherein

the liquid crystal display device has a characteristic such that a transmittance with respect to an application voltage has a minimum value, and

an electrode potential of the opposing substrate is set such that an absolute value of a potential difference becomes equal in a period in which a polarity of a liquid crystal drive potential applied to the liquid crystal layer with respect to the electrode potential of the opposing substrate is a positive polarity and in a period in which the polarity of the liquid crystal drive potential applied to the liquid crystal layer with respect to the electrode potential of the opposing substrate is a negative polarity in a black display.

7. A method of driving a liquid crystal display device according

to Claim 6, wherein

the liquid crystal display device operates in an electrically controlled birefringence mode.

8. A method of driving a liquid crystal display device according to any one of Claims 1 through 7, wherein

a polarity of a voltage applied to a pixel electrode formed individually for each of the plurality of pixels with respect to a predetermined reference is inverted at the period of two frame periods or longer and a voltage applied to a common electrode which opposes the pixel electrode with the liquid crystal layer therebetween is set to a constant, so that a polarity of a liquid crystal drive voltage applied to the liquid crystal layer with respect to a predetermined reference is inverted at the period of two frame periods or longer.

9. A method of driving a liquid crystal display device according to any one of Claims 1 through 7, wherein

a polarity of a voltage applied to a pixel electrode formed individually for each of the plurality of pixels with respect to a predetermined reference is inverted at the period of two frame periods or longer, and

a polarity of a voltage applied to a common electrode which opposes the pixel electrode with the liquid crystal layer therebetween is inverted in synchronization with the inversion of the polarity of the voltage applied to the pixel electrode.

10. A liquid crystal display device in which two substrates having respective electrodes for driving liquid crystal on opposing

surfaces are provided opposing each other with a liquid crystal layer therebetween and comprising a plurality of pixels, the liquid crystal display device comprising:

a liquid crystal drive signal processor which generates a liquid crystal drive voltage to be applied to the liquid crystal layer on the basis of an image signal; and

a predetermined period determination unit which determines elapse of a predetermined period which is two frame periods or longer and outputs a polarity inversion control signal for inverting a polarity of the liquid crystal drive voltage, wherein

the liquid crystal drive signal processor inverts the polarity of the liquid crystal drive voltage according to the polarity inversion control signal, and

a polarity of the liquid crystal drive voltage applied to the liquid crystal layer with respect to a predetermined reference is maintained at a same polarity in each pixel for a period of two frame periods or longer.

11. A liquid crystal display device according to Claim 10, wherein

the predetermined period determination unit determines elapse of a period of 10 seconds or longer, and

the liquid crystal drive signal processor maintains the liquid crystal drive voltage at the same polarity for a period of 10 seconds or longer.

12. A liquid crystal display device according to Claim 10 or 11, wherein

a period t determined by the predetermined period determination unit is set to be shorter than or equal to a period

in which a relationship between a maximum application voltage Vpmax to be applied to the liquid crystal layer and a residual direct current voltage Vdc generated in the liquid crystal layer when the maximum application voltage Vpmax is applied to the liquid crystal layer at the same polarity for the period t satisfies the following equation (1):

$$Vdc \leq 0.1 * Vpmax \quad \ldots (1)$$

13. A liquid crystal display device according to any one of Claims 10 through 12, wherein

a period determined by the predetermined period determination unit is set to a period so that application times of the liquid crystal drive voltage of a positive polarity applied to the liquid crystal layer and of the liquid crystal drive voltage of a negative polarity applied to the liquid crystal layer are equal to each other.

14. A liquid crystal display device according to any one of Claims 10 through 13, further comprising:

a setter unit which arbitrarily sets the determination period in the predetermined period determination unit.

15. A liquid crystal display device according to any one of Claims 10 through 14, wherein

the liquid crystal display device has a characteristic in which transmittance with respect to an application voltage to the liquid crystal layer has a minimum value,

the liquid crystal display device further comprises an

opposing electrode driver which drives an electrode on an opposing substrate, and

the opposing electrode driver sets an electrode potential of the opposing substrate so that an absolute value of a potential difference is equal during a period in which a polarity of a liquid crystal drive potential applied to the liquid crystal layer with respect to the electrode potential of the opposing substrate is a positive polarity and in a period in which the polarity of the liquid crystal drive potential applied to the liquid crystal layer with respect to the electrode potential of the opposing substrate is a negative polarity during black display.

16. A liquid crystal display device according to Claim 15, further comprising:

an adjustor unit which adjusts the electrode potential of the opposing electrode which is set by the opposing electrode driver.

17. A liquid crystal display device according to Claim 16, wherein

the liquid crystal display device operates in an electrically controlled birefringence mode.

18. A liquid crystal display device according to any one of Claims 10 through 17, further comprising:

an opposing electrode driver which drives an electrode on the opposing substrate, wherein

the opposing electrode driver comprises an opposing electrode drive voltage inverting unit which inverts a polarity of an electrode potential applied to the opposing substrate in synchronization with the inversion of polarity of the liquid

crystal drive potential applied to the liquid crystal layer.

19. A driver device of a liquid crystal display panel in which two substrates having respective electrodes for driving liquid crystal on opposing surfaces are provided opposing each other with a liquid crystal layer therebetween and comprising a plurality of pixels, the driver device comprising:

a liquid crystal drive signal processor which generates a liquid crystal drive voltage to be applied to the liquid crystal layer on the basis of an image signal, and

a predetermined period determination unit which determines elapse of a predetermined period which is two frame periods or longer and outputs a polarity inversion control signal for inverting a polarity of the liquid crystal drive voltage, wherein

the liquid crystal drive signal processor comprises a polarity processor which inverts the polarity of the liquid crystal drive voltage on the basis of the polarity inversion control signal, and

the liquid crystal drive voltage applied to the liquid crystal layer in each pixel is maintained at the same polarity with respect to a predetermined reference over a period of two frame periods or longer.

20. A driver device of a liquid crystal display panel according to Claim 19, wherein

the predetermined period determination unit determines elapse of a period of 10 seconds or longer, and

the liquid crystal drive signal processor maintains the liquid crystal drive voltage at the same polarity for a period of

10 seconds or longer.

21. A driver device of a liquid crystal display panel according to Claim 19 or Claim 20, further comprising:

a timing controller which generates a timing signal for controlling an operation timing at the liquid crystal display panel on the basis of a synchronization signal and a predetermined clock signal supplied with the image signal, wherein

the timing controller also functions as the predetermined period determination unit, determines elapse of a predetermined period on the basis of the synchronization signal, and generates the inversion control signal.